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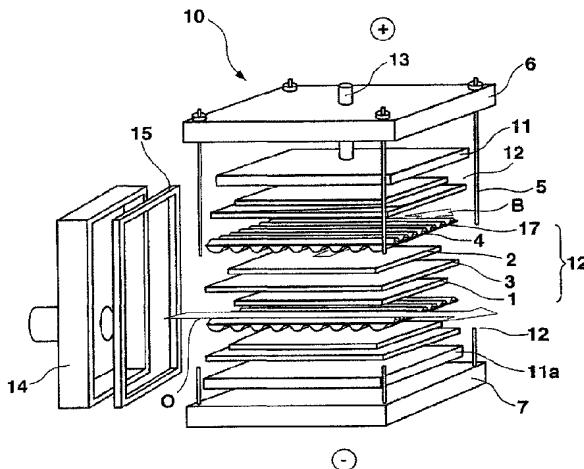
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(54) DISPOSITIF DE CELLULES ELECTROCHIMIQUES COMPORTANT UN RESERVOIR D'ELECTROLYTE

(54) FUEL-CELL ASSEMBLY COMPRISING AN ELECTROLYTE RESERVOIR

(57)

The invention relates to a fuel-cell assembly comprising a number of fuel cells (12) that are arranged in a stack (10). Each fuel cell contains an anode (1), a cathode (2) and a porous electrolyte matrix (3) arranged therebetween. An electrolyte reservoir (11), which compensates the electrolyte losses from the fuel cells (12) is provided at the end, or in the vicinity of the end of the fuel cell stack (10), said electrolyte being transported to the individual fuel cells (12) by electrical forces within the fuel cell stack (10). According to the invention, the electrolyte reservoir (11) is configured as a supporting structure which forms hollow chambers that contain porous bodies for absorbing the electrolyte in their pores.





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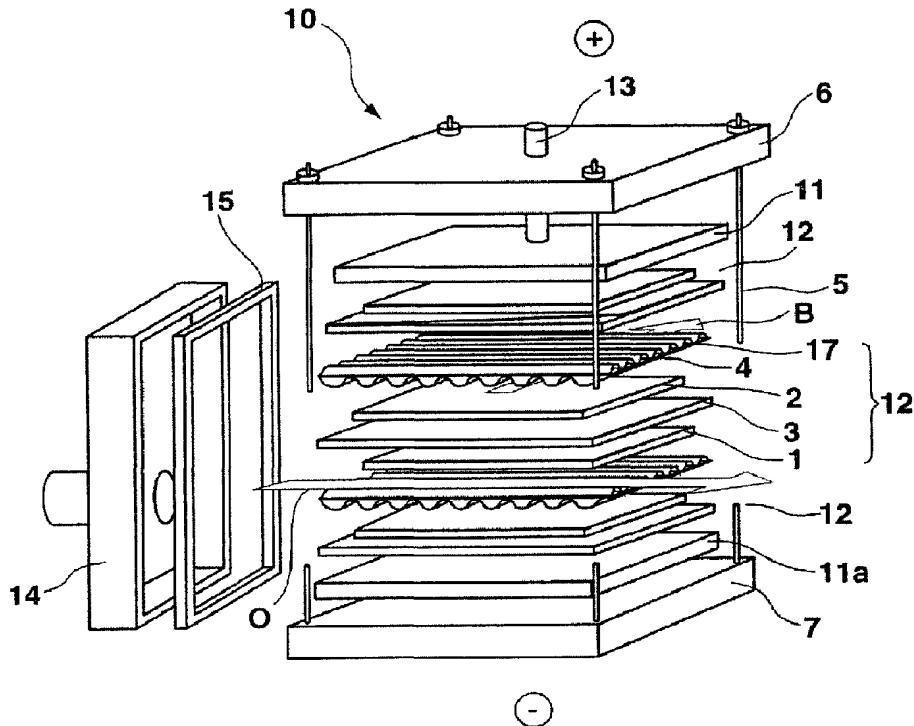
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(54) Title: FUEL-CELL ASSEMBLY COMPRISING AN ELECTROLYTE RESERVOIR



(57) Abrégé/Abstract:

The invention relates to a fuel-cell assembly comprising a number of fuel cells (12) that are arranged in a stack (10). Each fuel cell contains an anode (1), a cathode (2) and a porous electrolyte matrix (3) arranged therebetween. An electrolyte reservoir (11), which compensates the electrolyte losses from the fuel cells (12) is provided at the end, or in the vicinity of the end of the fuel cell stack (10), said electrolyte being transported to the individual fuel cells (12) by electrical forces within the fuel cell stack (10). According to the invention, the electrolyte reservoir (11) is configured as a supporting structure which forms hollow chambers that contain porous bodies for absorbing the electrolyte in their pores.

Abstract

The invention relates to a fuel-cell assembly comprising a number of fuel cells (12) that are arranged in a stack (10). Each fuel cell contains an anode (1), a cathode (2) and a porous electrolyte matrix (3) arranged therebetween. An electrolyte reservoir (11), which compensates the electrolyte losses from the fuel cells (12) is provided at the end, or in the vicinity of the end of the fuel cell stack (10), said electrolyte being transported to the individual fuel cells (12) by electrical forces within the fuel cell stack (10). According to the invention, the electrolyte reservoir (11) is configured as a supporting structure which forms hollow chambers that contain porous bodies for absorbing the electrolyte in their pores.

DESCRIPTION

Fuel Cell Assembly Comprising an Electrolyte Reservoir

The invention relates to a fuel cell assembly pursuant to the preamble of claim 1.

We know of fuel cell assemblies, especially assemblies of molten carbonate fuel cells, where a number of fuel cells, which each contain an anode, a cathode and a porous electrolyte matrix arranged between them, are arranged in the form of a fuel cell stack.

In molten carbonate fuel cells, mixtures of alkali carbonates are used as electrolyte, causing the fuel cells to be liquid at the operating temperature. The electrolyte is contained both in the porous electrolyte matrixes and in the anodes and cathodes of the fuel cells, which are likewise made of porous material, and is kept there with capillary force. The function and efficiency of a molten carbonate fuel cell are dependent upon the complete and correct filling of the electrolyte, which is accomplished during manufacturing by adhering to tight tolerance settings. Both over-filling and under-filling with electrolyte negatively influence the efficiency and durability of the cells.

During fuel cell operation, parts of the electrolyte contained in the cells are lost due to various mechanisms, of which the following are essential:

- due to the strong wetting property of the molten alkali carbonates, the electrolyte has the tendency of creeping out of the cell in the fringe area and on the orifices that are provided for supplying and removing fuel gas and oxidation gas, wherein it then spreads to the exterior surface of the fuel cell stack and the adjacent components;

- the alkali carbonates of the electrolyte enter into chemical reactions with construction materials of the fuel cells, wherein a portion of the electrolyte is bonded with the resulting chemical compounds; and
- constituents of the alkali carbonates bond with water, which is created in the fuel cells as a reaction product, to form hydroxides, which evaporate at the operating temperature of the fuel cells.

The gradual electrolyte loss during the life of the fuel cell leads to a decrease in power and may possibly represent a factor that limits the life of the fuel cell.

One possibility for overcoming the above-mentioned difficulties is to provide an electrolyte reservoir to compensate the electrolyte losses from the fuel cells.

For example we know from DE 195 45 658 A1 of a molten carbonate fuel cell where a porous body with an electrolyte supply is provided in at least one place to compensate electrolyte losses. This porous body forming the electrolyte supply is assigned to the individual fuel cell; in a fuel cell assembly comprising a number of fuel cells arranged in the form of a stack thus each individual fuel cell would be provided with such a porous body for maintaining a supply of electrolyte.

From JP 61074265 A we know of a matrix configuration for a fuel cell where the electrolyte is being distributed in the matrix from an electrolyte reservoir that is assigned to the matrix in order to compensate losses. Here as well, in the case of a fuel cell configuration comprising a number of fuel cells that are arranged in the form of a stack each matrix of the individual fuel cells would be equipped with such an electrolyte reservoir.

Further suggestions in which each individual fuel cell should be equipped with electrolyte reservoirs for compensating electrolyte losses are known from US 5 468 573, US 4 185 145, US 4 548 877 and JP 61277169 A.

Furthermore we know from US 4 467 019 and JP 07326374 A of fuel cell assemblies with several fuel cells that are arranged in the form of a stack, where the electrolyte matrix of each fuel cell, respectively, is connected with an electrolyte reservoir that is provided outside the fuel cell stack for the purpose of compensating electrolyte losses that occur.

Finally we know from US 4 761 348 of a fuel cell assembly where on the ends of the fuel cell stack, respectively, electrolyte reservoirs – one with an excess of electrolyte and one with a lack of electrolyte - are provided, which are separated from the complete cells of the stack by impermeable, yet electrically conductive separators, but are subjected to an electrolyte exchange with the fuel cells.

The existing solution suggestions have many disadvantages. In the case of individual electrolyte reservoirs that are provided in each fuel cell only a limited amount of electrolyte can be maintained unless a considerable increase in volume and cost of the cells is acceptable. In the case of devices for filling the electrolyte supply in the individual cells it is very difficult to distribute the replenish quantity exactly among the individual cells within the stack and fill each individual cell correctly. Channels or lines for filling the electrolyte form paths for parasitic currents along the fuel cell stack, which can reduce the power of the fuel cell assembly and even destroy it.

Another difficulty in connection with the loss and replenishing of electrolyte for fuel cells that are arranged in a stack consists of the fact that the electrically charged particles of the electrolyte migrate in the direction of the opposite polarity under the influence of the electric field that is generated by the fuel cell tension along the stack. The alkali ions contained in the electrolyte therefore have the tendency of migrating from the positive end to the negative end of the fuel cell stack under the influence of the electric field. Thus, the rate of electrolyte loss in the cells on the positive end of the fuel cell stack is considerably higher than that of the cells on the opposite end. With constantly

maintaining or replenishing electrolyte for all cells the cells would become overfilled in the vicinity of the negative end of the fuel cell stack and those on the positive end would not be filled sufficiently.

It is therefore the object of the present invention to create an improved fuel cell assembly comprising an electrolyte reservoir.

This task is resolved with a fuel cell assembly with the features of claim 1.

Beneficial further developments of the fuel cell assembly pursuant to the invention are described in the dependent claims.

The invention creates a fuel cell assembly comprising a number of fuel cells that are arranged in the form of a stack, wherein each cell contains electrodes in the form of an anode and a cathode and a porous electrolyte matrix arranged between them, as well as a current collector for contacting the electrodes, and wherein furthermore an electrolyte reservoir for compensating electrolyte losses from the fuel cells is provided. Pursuant to the invention, the electrolyte reservoir is arranged on or in the vicinity of an end of the fuel cell stack, wherein the electrolyte is transported to the individual fuel cells by electrical forces within the fuel cell stack, and wherein hollow chambers, which are formed by a supporting structure and which contain porous bodies absorbing the electrolyte in the pores, serves as the electrolyte reservoir.

A considerable advantage of the fuel cell assembly pursuant to the invention is that under the effect of the electrical forces acting in the fuel cell stack the electrolyte is supplied automatically to various positions within the stack while being adapted to the different electrolyte loss rates. Another benefit is that the invented fuel cell assembly is easy and inexpensive to manufacture and easy to operate. Another advantage consists of the fact that due to the lack of lines or channels along the fuel cell stack for distributing the electrolyte from the outside among the individual fuel cells paths for

disadvantageous leakage currents are eliminated. Since the electrolyte reservoir contains a supporting structure, it is not required that the material, which absorbs the electrolyte directly, assume the supporting function. The appropriate material is therefore mechanically relieved, which is beneficial with regard to its creep stability.

The electrolyte is preferably one component of a spreadable or flowing paste, which is introduced into the hollow chambers of the structure, wherein additional components of the paste after curing create a porous body whose pores contain the electrolyte. The supporting structure could be for example a current collector, which is installed on the positive end (in fuel cells the cathode) between the end plate and the last cell. Similarly also a large-pored foam structure can be provided as the supporting structure, where the pores are filled with paste. Alternatively the paste can be introduced into recesses or bore holes of the end plate so that the end plate itself serves as the supporting structure of the electrolyte reservoir.

Pursuant to another beneficial aspect of the invented fuel cell assembly the electrolyte reservoir is installed on one end of the fuel cell stack and an electrolyte-absorbing reservoir in the form of a porous body for absorbing excess electrolyte is provided on the other end of the fuel cell stack. This way, due to the migration of electrolyte from the electrolyte reservoir to the other end of the fuel cell stack, too much electrolyte that may be occurring is removed over time. The porous body for absorbing excess material can be designed accordingly like the electrolyte reservoir, with the corresponding benefits.

The electrolyte reservoir is preferably installed on the positive end of the fuel cell stack, and the electrolyte-absorbing reservoir for absorbing excess electrolyte is provided on the negative end of the fuel cell stack.

Pursuant to a beneficial development of the invented fuel cell assembly the electrolyte reservoir can be filled. Electrolyte losses occurring during operation of the fuel cell can

thus be compensated so that a continuously optimal operation of the fuel cell assembly is feasible.

Preferably an electrolyte filling line, which is connected with the electrolyte reservoir and extends from the fuel cell stack to the outside, for filling the electrolyte reservoir from the outside is provided.

A preferred embodiment provides for the electrolyte filling line to have a vertical or outwardly ascending course.

Pursuant to a particularly beneficial embodiment of the invented fuel cell assembly, the electrolyte filling line is provided for filling the electrolyte, which exists in solid form at ambient temperature, preferably in the form of pellets, wherein the solid electrolyte at the operating temperature melts in the fuel cell stack and is received by the electrolyte reservoir.

As already presented above, the electrolyte reservoir consists of a porous body, whose pores are filled with the electrolyte. The pore size of the electrolyte reservoir is preferably larger than that of the pores of the electrolyte matrix. This way capillary forces support the transport of electrolyte from the reservoir to the matrixes of the fuel cells.

Pursuant to a preferred embodiment of the invented fuel cell assembly the porous body of the electrolyte reservoir consists of fuel cell cathode material that is completely impregnated with electrolyte.

Pursuant to another preferred embodiment of the invented fuel cell assembly it is provided that the supporting structure of the electrolyte reservoir consists of an electrically conductive material, which serves as the electrical connection between the last fuel cell and the end of the fuel cell stack.

Pursuant to a beneficial embodiment of the invented fuel cell assembly it is provided that along the fuel cell stack between individual components of the fuel cells and/or the fuel cell stack existing capillary travel paths for the electrolyte are designed with regard to their thickness and/or their pore size such that an optimization of the electrolyte transport within the fuel cell stack from the electrolyte reservoir to the fuel cells takes place. This way the speed of transport and the type of distribution of electrolyte delivered from the electrolyte reservoir to the individual fuel cells can be optimized.

Pursuant to another preferred embodiment of the invented fuel cell assembly, means for monitoring the tension of the most positive fuel cell or a group of most positive fuel cells are provided and a decrease in this tension is used a signal for filling the electrolyte supply in the electrolyte reservoir. Since due to the electrical forces within the fuel cell stack the electrolyte loss of the fuel cells is higher the higher these forces are on the positive end of the fuel cell stack, the tension of one or more fuel cells on the positive end of the stack is a reliable signal for the necessity of replenishing the electrolyte supply.

Finally, pursuant to another beneficial aspect of the invented fuel cell assembly, it is provided that the electrolyte in the electrolyte reservoir is filled in a composition that differs from the initial composition of the electrolyte in the electrolyte matrixes of the fuel cells in order to compensate disproportionate electrolyte losses during the fuel cell operation. The electrolyte that is used for filling the electrolyte reservoir therefore contains those components that are lost at a higher rate during operation in higher concentrations than would correspond to the initial or normal composition of the electrolyte in the electrolyte matrixes.

The following describes examples of embodiments of the invented fuel cell assembly based on the drawing:

Figure 1 shows a diagrammatic perspective exploded view of a fuel cell assembly with fuel cells that are arranged in the form of a stack pursuant to an example of the invention, wherein for the purpose of better clarity only a few of the fuel cells that make up the fuel cell stack are depicted;

Figure 2 shows an enlarged side cross-sectional view of a current collector, in whose hollow chambers pursuant to another preferred example of an embodiment of the invention the electrolyte reservoir is provided with a porous body for absorbing excess electrolyte.

In Figure 1 the reference number 10 designates a fuel cell stack, which consists of a number of fuel cells 12, which each contain an anode 1, a cathode 2 and an electrolyte matrix 3 arranged between them. Adjacent fuel cells 12 are separated from each other by a bipolar plate 4 and adjoining current collectors 17, which serve the purpose of guiding the currents of a fuel gas B and an oxidation gas O separately via the anode 1 or via the cathode 2 of the fuel cells, wherein the anode 1 and the cathode 2 of adjacent fuel cells are separated from each other from a gas engineering point of view by the bipolar plate 4. The current collectors 17 ensure electrical contacting of the cells among each other.

The fuel cell stack 10, which contains a variety of such fuel cells 12, of which however only a few are shown in the figure for clarity reasons, is closed on its top and on its bottom, respectively, by an end plate 6, 7, wherein these end plates 6, 7 are connected with each other by rods 5 and are tensioned in relation to one another so that the individual fuel cells 12 are held against each other at a specified pressing force. On the exterior sides of the fuel cell stack gas distributors 14 are provided, which are sealed against the fuel cell stack 10 by gas distributor gaskets 15 and serve the purpose of feeding and removing currents of fuel gas B and oxidation gas O. For clarity reasons only one such gas distributor 14 including the gas distributor gasket 15 is shown in the figure.

On the upper end of the fuel cell stack 10, which corresponding to the orientation of the fuel cells 12 in relation to the position of their anode 1 and cathode 2 is the positive end of the fuel cell stack 10, an electrolyte reservoir 11 is arranged, which is located between the uppermost, i.e. the most positive fuel cell 12 and the upper end plate 6 of the fuel cell stack 10.

The electrolyte reservoir 11 consists of a supporting structure, in whose hollow chambers porous bodies 16 are arranged, the pores of which are filled with the electrolyte. The electrolyte is transported from the electrolyte reservoir 11 by electrical forces within the fuel cell stack 10 to the individual fuel cells 12 in order to compensate the electrolyte losses occurring there. In detail this takes place such that during operation of the fuel cell assembly the electrolyte, i.e. the ions contained in it, migrate via capillary paths or surface paths from the positive to the negative end of the fuel cell stack under the influence of the electric field existing within the fuel cell stack. The paths can e.g. be on gasket surfaces with external gas distributors or the surfaces of gas distribution channels within the stack in the case of a fuel cell assembly with internal gas distribution.

The supporting structure is preferably a current collector 4a, which is arranged between the end plate 6 and the last fuel cell 12 of the stack. Alternatively the supporting structure consists of structural foam with macro-pores. A paste, which can be cast or spread, is filled into the hollow chambers of the current collector or structural foam. The paste consists of powdery starting substances, which are mixed with a liquid binding agent. A curing process creates a porous body 16, whose pores hold the electrolyte.

The pore size of the porous body 16 holding the electrolyte is larger than the size of the pores of the electrolyte matrix 3 of the fuel cells so that due to the ratio of the capillary retaining forces, which act upon the electrolyte, between the electrolyte reservoir 11 and electrolyte matrixes 3 of the fuel cells 12 the electrolyte, migrating along the fuel cell stack 10, will have its source in the electrolyte reservoir 11 instead of in the active fuel

cell components. On the other hand, due to the capillary forces, any deficiency of electrolyte in the matrixes and/or electrodes of the fuel cells will be filled from the small, yet constant electrolyte quantity migrating from the electrolyte reservoir 11 until all small pores of the matrix 3 and/or the electrodes 1, 2 have been filled.

The porous body 16 of the electrolyte reservoir 11 consists preferably of the material of the fuel cell cathodes, which is completely impregnated with electrolyte. The porous body 16 can also be inserted or filled into the hollow chambers in the form of cured molded pieces. Preferably however a paste-like mass is inserted, which when exposed to air cures within a short period of time while forming pores. The composition of the electrolyte maintained in the electrolyte reservoir 11 can be that of the electrolyte that was introduced into the electrolyte matrixes during the manufacture of the fuel cells; preferably the electrolyte reservoir 11 however is filled with electrolyte that differs from the initial composition of the electrolyte in the matrixes 3 of the fuel cells 12 in order to compensate disproportionate electrolyte losses during fuel cell operation. This means that the electrolyte in the electrolyte reservoir 11 contains those components to a higher percentage that are lost more quickly during fuel cell operation.

The capillary travel paths serving the distribution of electrolyte throughout the fuel cell stack 10 are dimensioned with regard to their thickness and/or pore size such that the electrolyte transport from the electrolyte reservoir 11 to the fuel cells 12 is optimized so that the electrolyte quantity transported via these paths largely corresponds to the electrolyte quantity that is lost in the fuel cells 12.

An electrolyte filling line 13, which extends outward from the fuel cell stack 10 and serves the purpose of filling the electrolyte reservoir 11, is connected with the electrolyte reservoir 11. On the inside, this electrolyte filling line 13 is in contact with the porous body of the electrolyte reservoir 11 and has an ascending or vertical course upward to the outside. The electrolyte filling line 13 is provided for replenishing electrolyte, which exists in solid form at ambient temperature, preferably in the form of pellets, which can

be filled into filling line 13, drop into the interior of the fuel cell stack 10 and melt at the operating temperature existing there, and can be absorbed under the effect of the capillary forces of the porous body forming the electrolyte reservoir 11. The quantity and frequency with which the electrolyte must be replenished via the filling line 13 can be calculated from experimental data and experience values in respect of typical electrolyte loss in the affected fuel cell stack.

Since the supporting structure of the electrolyte reservoir 11 preferably consists of an electrically conductive material, it can be used simultaneously for contacting the last fuel cell on the positive end of the fuel cell stack 10, specifically for contacting the cathode 2 of the fuel cell 12 located on the positive end of the fuel cell stack 10. On the other end of the fuel cell stack 10 additionally a corresponding structure with a porous body, an electrolyte-absorbing reservoir 11a for absorbing excess electrolyte, can be provided.

Pursuant to the example shown in Figure 2, the electrolyte reservoir 11 exists in a current collector 4a, whose hollow chambers are filled with a porous body 16. This current collector 4a is located between an end plate 6 and a bipolar plate 4 of the adjacent last cell, i.e. on the positive end of the fuel cell stack 10. A current collector is located between the bipolar plate 4 and cathode 2 of the adjoining cell, however for clarity reasons it is not shown in Figure 1. The electrolyte reservoir on the other end of the fuel cell stack 10 can be designed accordingly.

Pursuant to an alternative embodiment, the hollow chambers for absorbing a spreadable and flowing paste for the purpose of forming a porous body can also be designed as recesses or bore holes in the end plates 6, 7.

The reservoir 11a for absorbing excess electrolyte can, preferably like the electrolyte reservoir 11, be formed by pouring a flowing mass into a current collector 4a. For the manufacture of the electrolyte reservoir, this mass consists e.g. of a ceramic powder

(pore formation), the electrolyte material and a binding agent and/or solvent, or for the manufacture of the body absorbing excess electrolyte e.g. of a ceramic powder (pore formation) and a binding agent and/or solvent, however not, or only to a very limited extent, of the electrolyte material, which then only assumes the function of a high-temperature adhesive for the ceramic particles. After curing the binding agent, the current collector 4a equipped with the electrolyte reservoir 11 can be installed on the positive end of the fuel cell stack 10, or the electrolyte-absorbing reservoir 11a absorbing excess electrolyte can be installed on the negative end of the fuel cell stack 10.

Information as to whether the electrolyte supply in the electrolyte reservoir 11 is still sufficient is obtained by monitoring the tension of the most positive fuel cell, i.e. the fuel cell which is located on the positive end of the fuel cell stack 10 or a group of fuel cells on this end of the fuel cell stack 10, wherein a drop in tension is used as a signal for replenishing the electrolyte supply in the electrolyte reservoir 11 via the filling line 13. A decrease in electrolyte in a fuel cell leads to a drop in the fuel cell tension and can thus be interpreted as a representative signal for an electrolyte loss from the fuel cell. Since due to the electric field existing in a fuel cell stack the fuel cells located on the positive end of the fuel cell stack 10 are subject to the larger electrolyte loss, the monitoring of tension of one or more cells located on the positive end of the fuel cell stack 10 is a suitable means for gaining an appropriate signal for filling the electrolyte.

Number Designation List

- 1 anode
- 2 cathode
- 3 electrolyte matrix
- 4 bipolar plate
- 4a current collector
- 5 rod
- 6 end plate
- 7 end plate

- 10 fuel cell stack
- 11 electrolyte reservoir
- 11a electrolyte-absorbing reservoir
- 12 fuel cell
- 13 filling line
- 14 gas distributor
- 15 gas distributor gasket
- 16 porous body
- B fuel gas
- O oxidation gas

MODIFIED PATENT CLAIMS

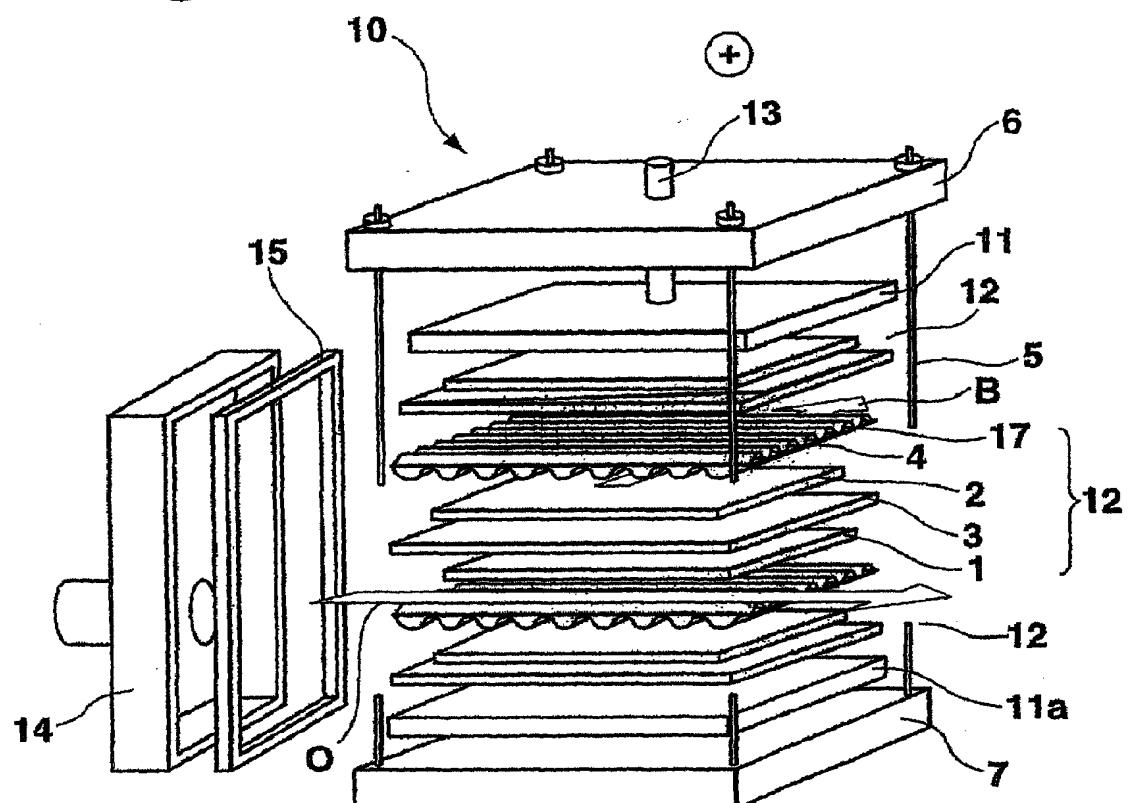
1. Fuel cell assembly comprising a number of fuel cells (12) that are arranged in the form of a stack (10) between end plates (6, 7) and contain, respectively, electrodes in the form of an anode (1) and a cathode (2) and a porous electrolyte matrix (3) arranged between them, and contain current collectors (17) that are arranged between the electrodes of two fuel cells (12) as well as bipolar plates (4), and comprising an electrolyte reservoir (11) for compensating the electrolyte losses from the fuel cells (12), wherein the electrolyte reservoir (11) is provided on or in the vicinity of an end of the fuel cell stack (10) and wherein the electrolyte reservoir (11) consists of hollow chambers that are provided in the fuel cell assembly, characterized in that the electrolyte is introduced into said hollow chambers as a component of a spreadable or flowing paste, wherein additional components of the paste result in the porous body (16) after curing.
2. Fuel cell assembly pursuant to claim 1, characterized in that the paste is created by stirring powdery starting substances with a liquid binding agent.
3. Fuel cell assembly pursuant to claim 1 or 2, characterized in that the electrolyte reservoir (11) consists of a structure, which forms hollow chambers and is located between the end plate (6) and the last cell on the positive end of the fuel cell stack (10).
4. Fuel cell assembly pursuant to one of the claims 1 through 3, characterized in that a current collector (4a) is used as the structure forming the hollow chambers, as the one that is used in other areas of the fuel cell stack for current contacting.
5. Fuel cell assembly pursuant to one of the claims 1 through 3, characterized in that a foam structure with macro-pores serves as the structure forming the hollow chambers.

6. Fuel cell assembly pursuant to one of the claims 1 through 2, characterized in that the hollow chambers are designed in the end plates (6, 7) in the form of recesses or bore holes.
7. Fuel cell assembly pursuant to one of the claims 1 through 6, characterized in that the electrolyte reservoir (11) is installed on one end of the fuel cell stack (10) and that on the other end of the fuel cell stack (10) an electrolyte-absorbing reservoir (11a) for absorbing excess electrolyte is provided.
8. Fuel cell assembly pursuant to claim 6, characterized in that the electrolyte reservoir (11) is installed on the positive end of the fuel cell stack (10) and that the electrolyte-absorbing reservoir (11a) for absorbing excess electrolyte is provided on the negative end of the fuel cell stack (10).
9. Fuel cell assembly pursuant to claim 7 or 8, characterized in that the electrolyte-absorbing reservoir (11a) for absorbing excess electrolyte is formed by pouring in a flowing mass, which after curing forms a porous body.
10. Fuel cell assembly pursuant to one of the claims 1 through 9, characterized in that the electrolyte reservoir (11) can be filled.
11. Fuel cell assembly pursuant to claim 10, characterized in that an electrolyte filling line (13), which is connected with the electrolyte reservoir (11) and extends outward from the fuel cell stack (10), is provided for filling the electrolyte reservoir (11) from the outside.
12. Fuel cell assembly pursuant to claim 11, characterized in that the electrolyte filling line (13) has a vertical or outwardly ascending course.
13. Fuel cell assembly pursuant to claim 11 or 12, characterized in that the electrolyte filling line (13) is provided for replenishing the electrolyte, which

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exists in solid form at ambient temperature, preferably in the form of pellets, wherein the solid electrolyte at operating temperature melts in the fuel cell stack (10) and is absorbed by the electrolyte reservoir (11).

14. Fuel cell assembly pursuant to one of the claims 1 through 13, characterized in that the pore size of the electrolyte reservoir (11) is larger than that of the pores of the electrolyte matrix (3).
15. Fuel cell assembly pursuant to one of the claims 1 through 14, characterized in that the porous body of the electrolyte reservoir (11) consists of fuel cell cathode material, which has been completely impregnated with electrolyte.
16. Fuel cell assembly pursuant to one of the claims 1 through 15, characterized in that the structure of the electrolyte reservoir (11) forming the hollow chambers consists of an electrically conductive material.
17. Fuel cell assembly pursuant to one of the claims 1 through 16, characterized in that capillary travel paths for the electrolytes existing along the fuel cell stack (10) between individual components of the fuel cells (12) and/or of the fuel cell stack (10) are designed such with respect to their thickness and/or their pore size so as to optimize the electrolyte transport within the fuel cell stack (10) from the electrolyte reservoir (11) to the fuel cells (12).
18. Fuel cell assembly pursuant to one of the claims 1 through 17, characterized in that means for monitoring the tension of the most positive fuel cell (12) or a group of most positive fuel cells are provided and that a decrease in tension is interpreted as a signal for replenishing the electrolyte supply in the electrolyte reservoir (11).
19. Fuel cell assembly pursuant to one of the claims 1 through 18, characterized in that the electrolyte in the electrolyte reservoir (11) is replenished in a composition that differs from the initial composition of the electrolyte in the electrolyte matrixes (3) of the fuel cells (12) in order to compensate disproportionate electrolyte losses during fuel cell operation.

Fig. 1**Fig. 2**